

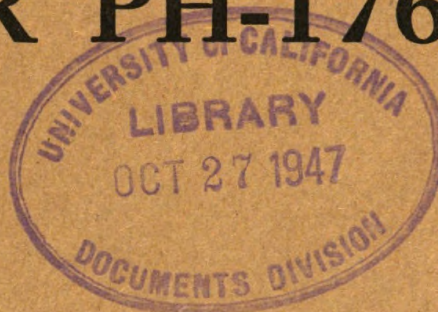
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# TM 11-2355

AR DEPARTMENT TECHNICAL MANUAL

U.S. Dept. of Army

## DRYER PH-176



### RESTRICTED. DISSEMINATION OF RESTRICTED MATTER.

The information contained in restricted documents and the essential characteristics of restricted materiel may be given to any person known to be in the service of the United States and to persons of undoubted loyalty and discretion who are cooperating in Government work, but will not be communicated to the public or to the press except by authorized military public relations agencies. (See also par. 28, AR 380-5, 15 Mar 1944.)

AR DEPARTMENT

7 OCTOBER 1944





**WAR DEPARTMENT TECHNICAL MANUAL**  
**TM 11-2355**

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**DRYER PH-176**



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WAR DEPARTMENT,  
WASHINGTON 25, D. C., 7 OCTOBER, 1944.

TM 11-2355, Dryer PH-176, is published for the information  
and guidance of all concerned.

[A. G. 300.7 (16 Mar 44).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,  
*Chief of Staff.*

OFFICIAL:

J. A. ULIO,  
*Major General,*  
*The Adjutant General.*

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(For explanation of symbols see FM 21-6.)



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# DESTRUCTION NOTICE

**WHY** — To prevent the enemy from using or salvaging this equipment for his benefit.

**WHEN** — When ordered by your commander.

**HOW** —

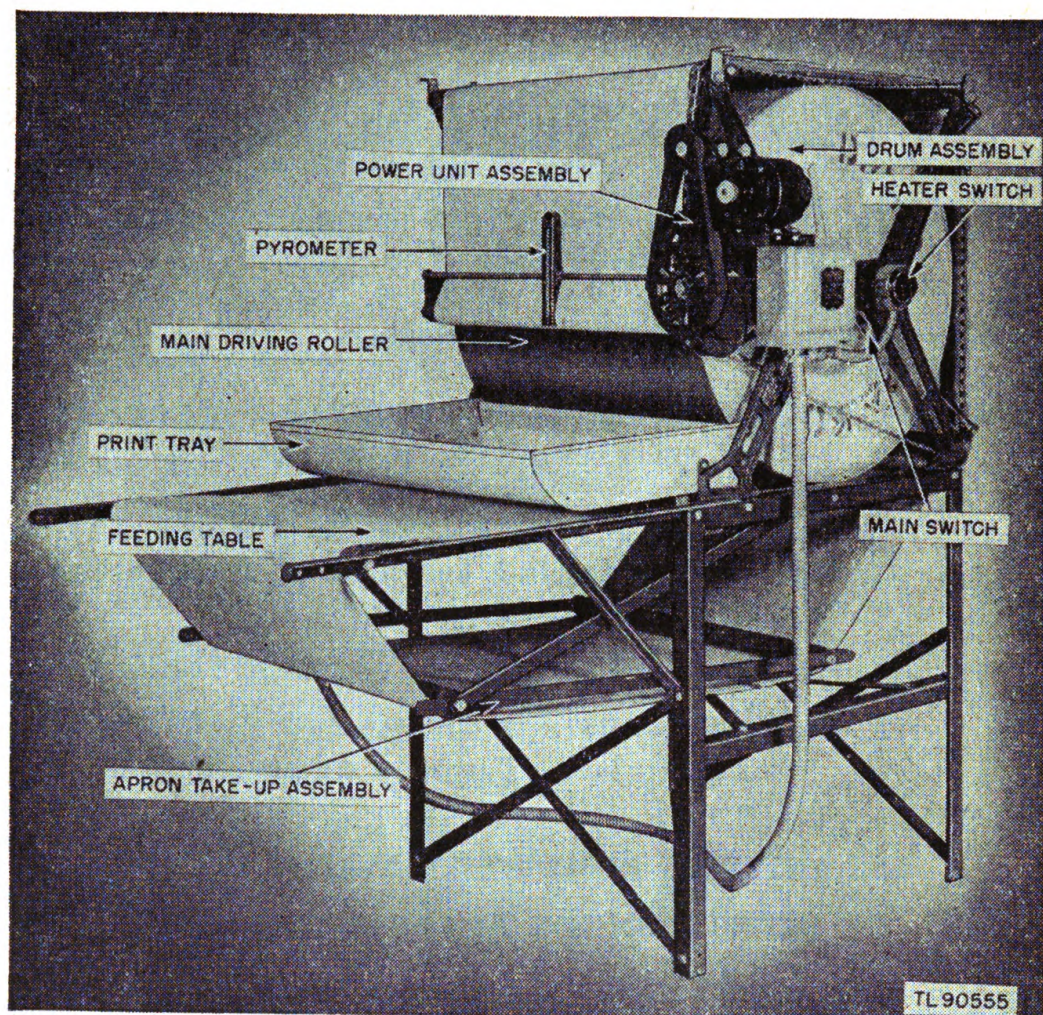
1. Smash — Use sledges, axes, handaxes, pickaxes, hammers, crowbars, heavy tools.
2. Cut — Use axes, handaxes, machetes.
3. Burn — Use gasoline, kerosene, oil, flame throwers, incendiary grenades.
4. Explosives — Use firearms, grenades, TNT.
5. Disposal — Bury in slit trenches, fox holes, other holes. Throw in streams. Scatter.

## USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT.

**WHAT** —

1. Smash — Superstructure, base assembly, drum and heating units, motor unit and control unit.
2. Cut — Apron, feed wire, heater wirings.
3. Burn — Apron, roller assemblies, technical manual.
4. Bend — Feeding table frame, legs, stays, apron take-up assembly.
5. Bury or scatter — All parts of this equipment.

# DESTROY EVERYTHING



**Figure 1.** Dryer PH-176.



# RESTRICTED

## SECTION II

### DESCRIPTION

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1. **PURPOSE.** Dryer PH-176 (fig. 1) is a complete, electrically operated unit for drying various weights and sizes of matte or semimatte photographic prints quickly and continuously. When set up for use, this unit is  $63\frac{7}{8}$  inches long,  $39\frac{1}{4}$  inches wide, and  $61\frac{3}{4}$  inches high. Crated, it measures 35 by 39 by 42 inches and weighs 417 pounds.

2. **COMPONENT PARTS.** Dryer PH-176 consists of a base assembly to which are attached the feeding table frame (fig. 3) and apron take-up assembly (fig. 1); two side frames for the superstructure; a drum containing the heating unit assembly; the apron; the print tray; the power unit assembly; the safety or main switch box with two 30-ampere fuses and one 4-ampere fuse; one 30-ampere, 125-volt, porcelain base rotary type switch snap with settings for HIGH, MED, LOW, and OFF; and the roller assemblies.

#### 3. DESCRIPTION.

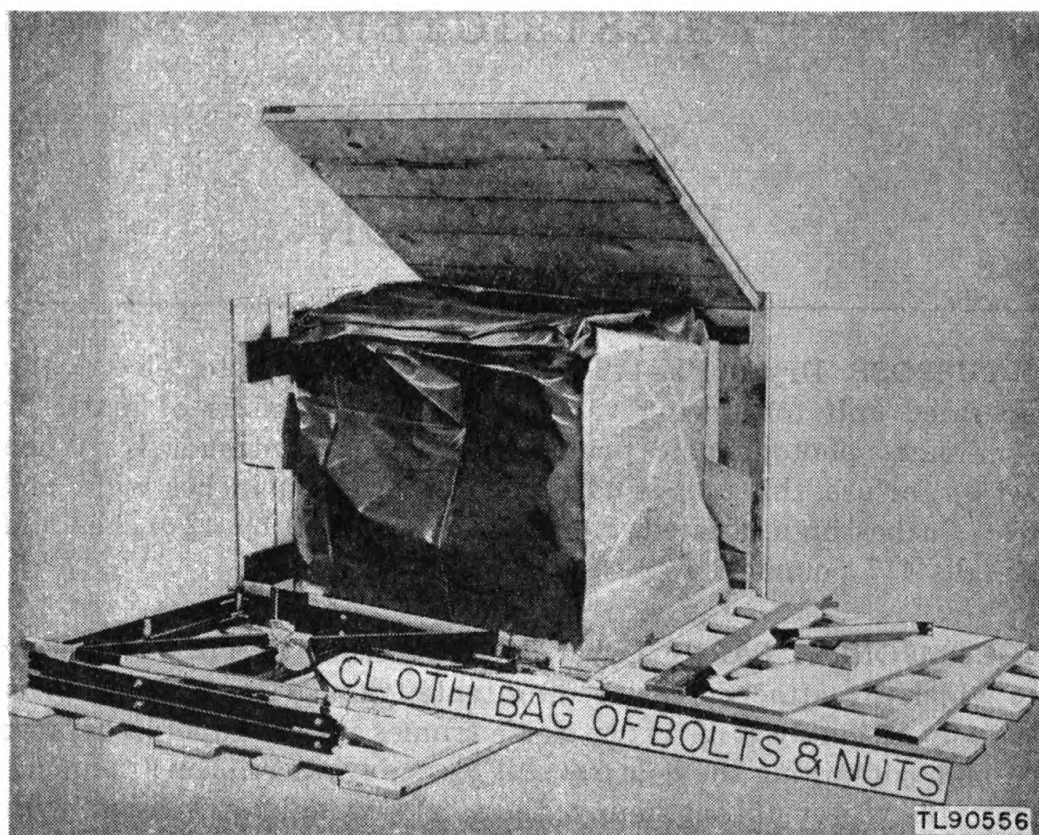
a. **Base Assembly.** The base assembly is a steel framework with four legs braced by three pairs of crossed integral stays. The feeding table arms are attached to the base, and the apron take-up assembly is swung from the base (fig. 3).

b. **Side Frames.** The right and left side frames are castings mounted on the right and left legs. They support the drum journal, the roller assemblies, the print tray, the power unit assembly, and the control box assembly. The side frames are connected by the stripping rod and the crossed top and rear guy rods.

c. **Drum.** The drum is a closed, metal cylinder rotating on a journal. It has a handhole cover in each end.

d. **Heating Unit Assembly.** The heating unit assembly consists of three heater coils carried in three heater bricks and attached at three taps, which are mounted in a heater-brick support and fastened to the drum journal (fig. 14).

e. **Apron.** The apron is woven, fiber-backed, and canvas-covered.



*Figure 2. Method of unpacking.*

It is held against the drum, and is carried over the main driving roller (fig. 1), standard drive rollers, and feeding table rollers. This apron carries the prints to, and holds them against, the drum.

**f. Feeding Table.** The front portion of the apron, which runs over a feeding table roller, forms the feeding table, on which prints are placed to be carried to the drum. The feeding table arms which extend forward from the legs of the base carry the roller (fig. 8).

**g. Apron Take-up Assembly.** An apron take-up frame assembly carries two parallel idler rollers which ride on the lower run of the apron. The entire take-up assembly is swung from the base by two integral stays (fig. 1).

**h. Print Tray.** A print tray is mounted between the side frames and below the stripping rod to catch the prints as they are dropped from the drum (fig. 1).

**i. Power Unit Assembly (fig. 6).** The power unit assembly uses a gear train to adapt the speed of the alternating-current motor to the operating speed of the drum. The alternating-current motor



is connected to the worm shaft by a  $\frac{1}{4}$ -inch belt  $27\frac{3}{4}$  inches long and another  $\frac{1}{4}$ -inch belt 13 inches long. The short belt is placed over a three-step cone pulley on the motor shaft and over another three-step cone pulley on the countershaft. The long belt is placed over the outside hub of the countershaft and over the belt pulley attached to the worm shaft. The worm shaft rotates the main worm gear which is attached to the main driving roller. The main driving roller in turn drives the standard drive rollers by means of an endless chain traveling over the sprockets on the ends of each roller. The speed of rotation of these rollers, which in turn determines the speed of travel of the apron and the drum, can be controlled by the positioning of the short belt on the cone pulleys. This operation is fully explained in paragraph 7d.

**j. Switches.** The power supply is controlled by two switches. The main switch is a 30-ampere, externally controlled safety switch. The box for this switch contains two 30-ampere cartridge fuses for the protection of the heating elements, and one 4-ampere cartridge fuse for the protection of the motor (fig. 5). This switch has two positions: ON and OFF. The second switch is either a black or white porcelain base rotary snap switch connected into the circuit supplying the heating elements. This switch has four positions: OFF, LOW, MED (medium), and HIGH, and controls the amount of heat applied to the prints through the drum surface.

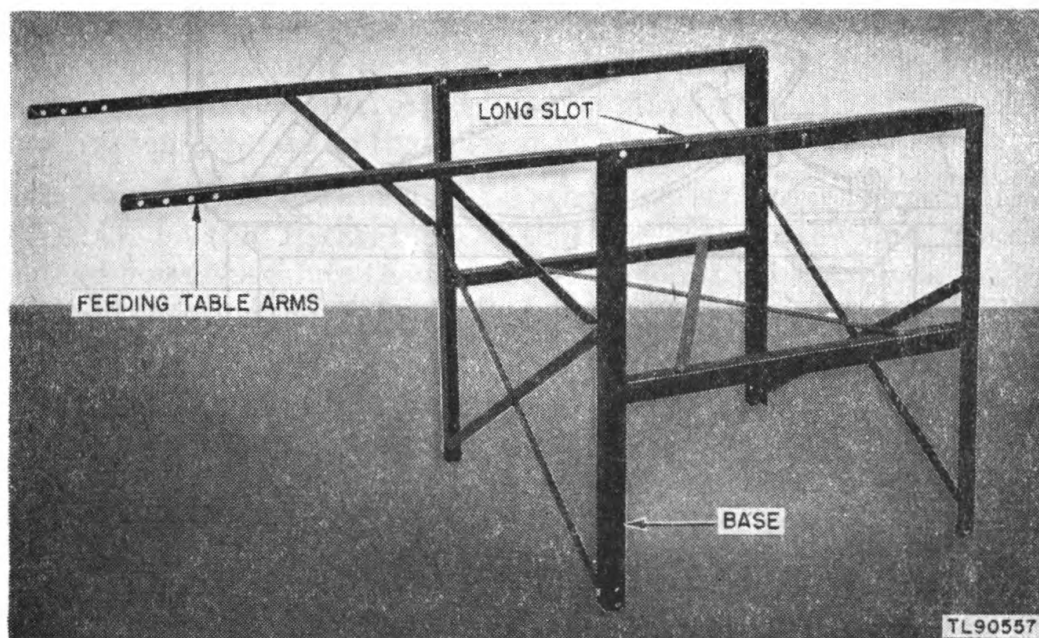
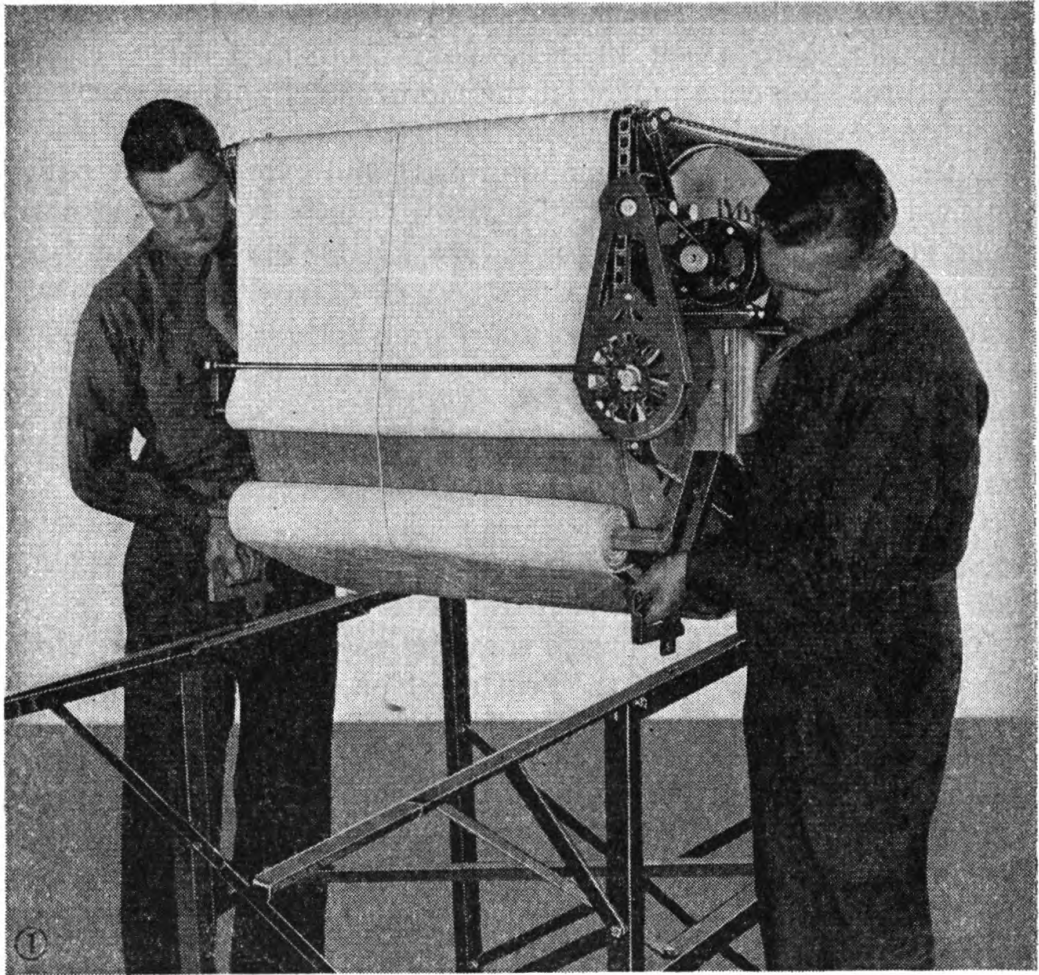
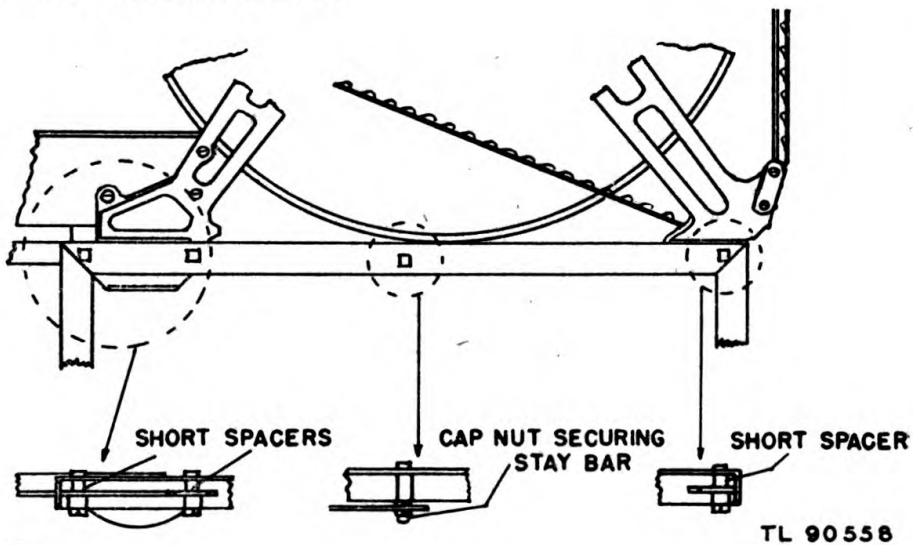


Figure 3. Base and feeding-table arms assembled.



① Setting superstructure in place.



② Position of spacers.

Figure 4. Mounting dryer superstructure.



## SECTION II

# INSTALLATION AND OPERATION

---

### 4. GENERAL.

a. Once installed and connected electrically as described below, Dryer PH-176 becomes a complete operating unit. The power source must be capable of providing at least 30 amperes.

b. The packaging when the dryer is first received contains moisture-proof paper with bags of silica gel attached to absorb excess moisture. If the dryer is carefully unpacked, these same wrappings may be used for a later shipment (fig. 2).

### 5. INSTALLATION.

a. **Unpacking.** Remove the sides of the crate and all the parts which are bolted to the sides (fig. 2). Great care must be exercised to sort out all the small parts carefully and not lose them during unpacking. The superstructure, including the apron, drum, side frames, and connected parts, is sealed in the moistureproof bag and crated in an assembled condition. Bolts and spacers used in packing are not used in the assembly of the machine.

b. **Base.** Erect the right and left leg assemblies on a level floor, placing the long slots in the top angles opposite each other. Connect the three sets of crossed integral stays to form the base. Do not tighten the nuts on the bolts at this time (fig. 3).

c. **Mounting Superstructure.** Lift the superstructure onto the base (fig. 4), placing it carefully so that the lugs on the side frames extend downward into the slots on the top of the base. Fasten with the bolts, noting carefully the location of the spacers as shown in figure 4 ②.

d. **Feeding Table and Apron Take-up.** (1) Attach the feeding table arms (fig. 3), using the bolts already in place in the front legs and the top side crossbars of the metal stand. Loosen the front apron guides and swing them forward to receive the corner bolts which secure the feeding-table arms.

(2) Remove the protecting paper from the apron packed in front of the drum, and draw the apron loop out toward the front end of the feeding table arms.

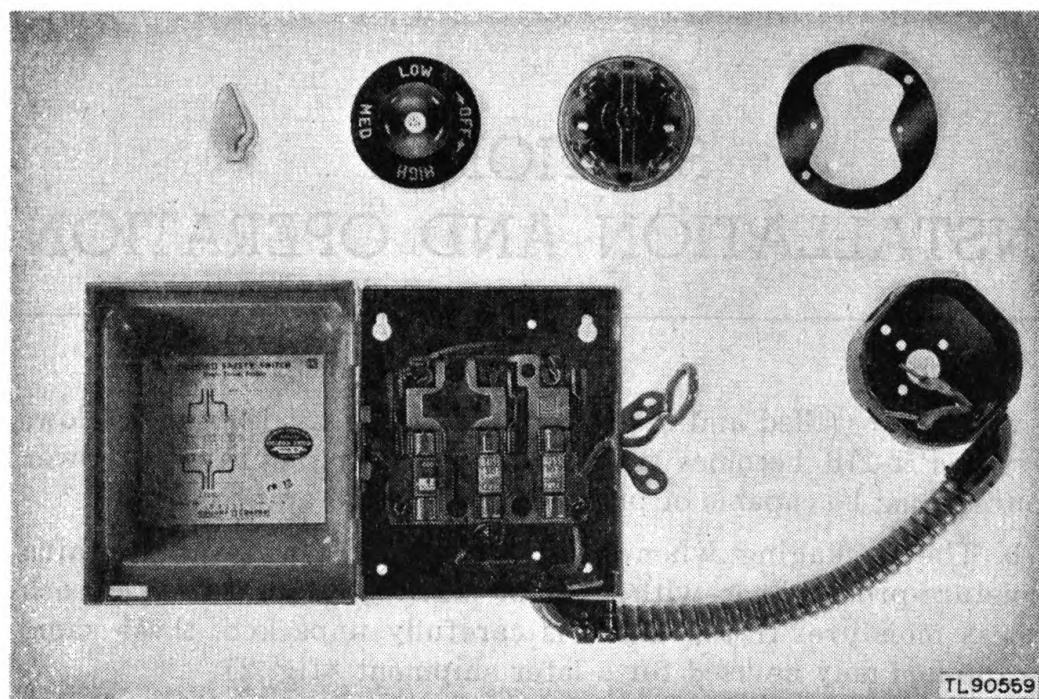


Figure 5. Switches, controls, and fuse box.

(3) Next insert the feeding table roller (the longest of the rollers furnished) through the apron loop. Fasten it by sliding the roller rod through the holes at the end of the feeding table arms. Use the holes nearest the drum. Later, when the apron has been used long enough to stretch, the feeding table roller can be advanced to the second, third, or fourth pair of holes to take up the slack.

(4) Insert the two take-up rollers inside the apron loop below the feeding table arms. Fasten the two rollers together with the horizontal bars. At the same time these bars are attached, fasten the shorter stay bars outside the horizontal bars to hold them in position. Note that the ends of the horizontal bars extend beyond the take-up rollers and thus act as a guide for the apron (fig. 1).

**e. Motor.** Bolt the motor shelf casting to the bracket casting with the two bolts. Then bolt the motor to the shelf with the four bolts from the cloth bag (fig. 6). Be sure that the cone pulleys on the countershaft and the motor shaft are aligned with each other. Place the short belt (fig. 10 ①) over either the first, second, or third pair of grooves in the two cone pulleys.

**f. Print Tray and Pyrometer.** Fasten the print tray (fig. 1) to the lower forward arms of the X-shaped side brackets with the three small bolts and nuts at each end of the tray. Snap the pyrometer

onto the cross stay rod above the print tray (fig. 17). Adjust it so that its lower end presses lightly against the drying apron.

**g. Electrical Connections.** The electrical connections must be made only by an experienced electrician. The diagram (fig. 18) shows the connections to be made.

**h. Leveling.** Use a carpenter's level, if available, to determine when the dryer is "set square."

## **6. PREPARATION FOR OPERATION.**

**a.** Remove any paper, packing material, or wrappings left in the machine.

**b.** Oil the dryer as instructed in paragraph 9. Check the oil in the motor, gear box, and drum journal before operating. Take great care not to soil the apron while oiling.

**c.** Check the tightness of the drive chain, which should have enough slack to permit about  $\frac{1}{2}$  inch of vertical movement in the portion extending between the two top standard drive sprockets. Adjust the tightness of the chain by loosening the nut which holds the adjuster arm and adjuster sprocket (fig. 16). Move the arm in the direction required to get the proper amount of slack and then tighten the nut.

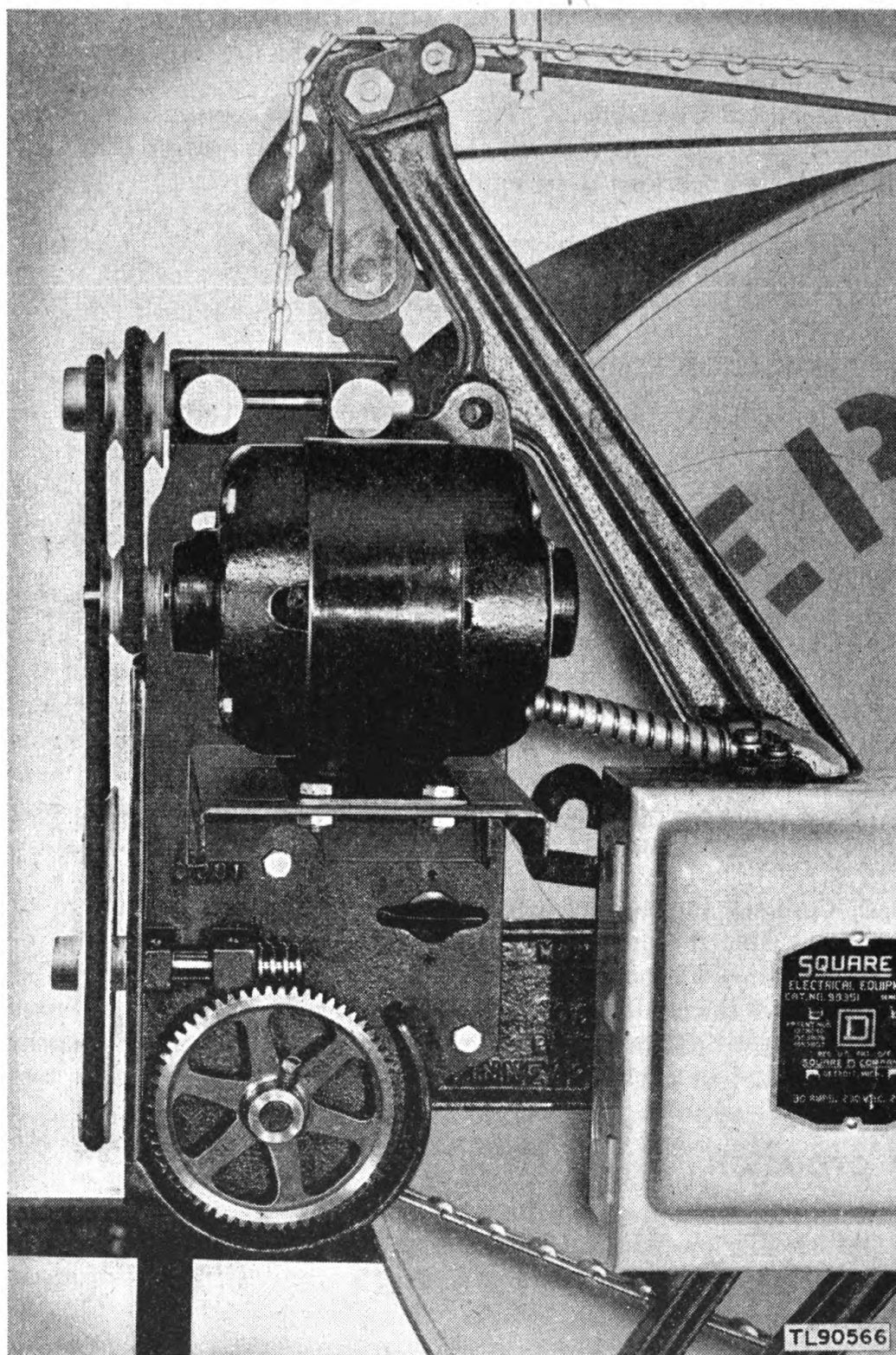
**d.** Connect the service cord to 115-volt, 30-ampere source of current. Turn the motor switch to the ON position and the heater switch to the OFF position. Let the dryer operate about 20 minutes, and observe the centering of the apron. If the apron runs off center either way or if any other difficulties are encountered, see the trouble chart in paragraph 10.

## **7. OPERATION.**

**a.** Set the motor switch to ON and the heater switch to either LOW, MED, or HIGH as discussed below. The drum will now rotate and start to heat. Allow about 15 minutes for the drum to heat up properly.

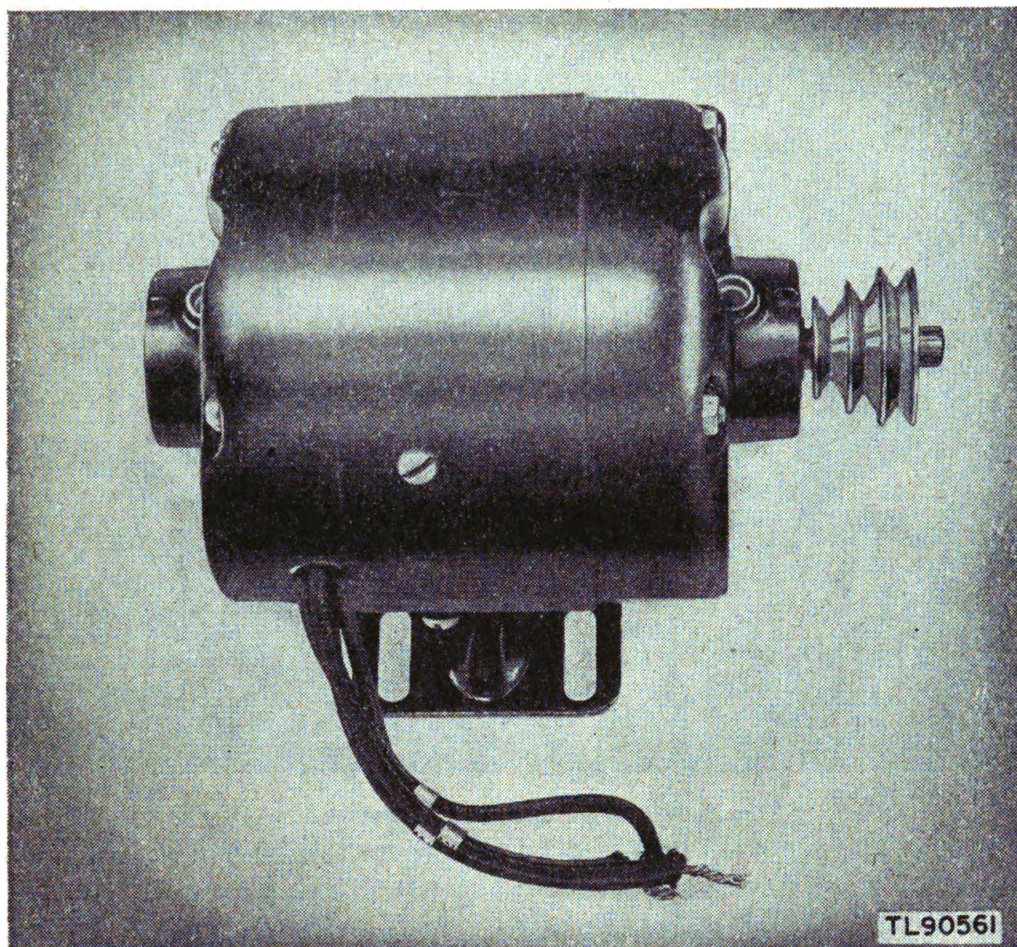
**b.** Wash prints sufficiently before drying them. Improperly washed prints contain chemicals which will rot and stain the apron. When prints have been washed and are ready for drying, *drain the surplus water from them*, and place them *face down* on the feeding table portion of the apron (fig. 8). Lay the print on the apron;





*Figure 6. Power unit assembly, side view.*





*Figure 7. Motor, Dryer PH-176.*

slide it slightly forward in order to remove any drops of water from the face of the print. **DO NOT ALLOW WATER TO DRIP ONTO THE APRON FROM THE PRINTS BEING FED INTO THE DRYER.** The prints are carried forward, held against the drum, and dropped into the print tray after they have completed the drying cycle.

c. Watch the pyrometer (fig. 17) carefully while drying prints. It indicates the degrees of heat of the drum as **LOW, NORMAL, or HIGH.** Too much heat will dry the prints to excess, causing them to be brittle, and to wrinkle at the edges. The stages of heat as recorded on the pyrometer compare roughly with the settings of the heater switch **LOW, MED, and HIGH** (fig. 16). When the dryer is running at full capacity, it is generally best to run it on **HIGH**, but great care must be taken not to overdry the prints. Before



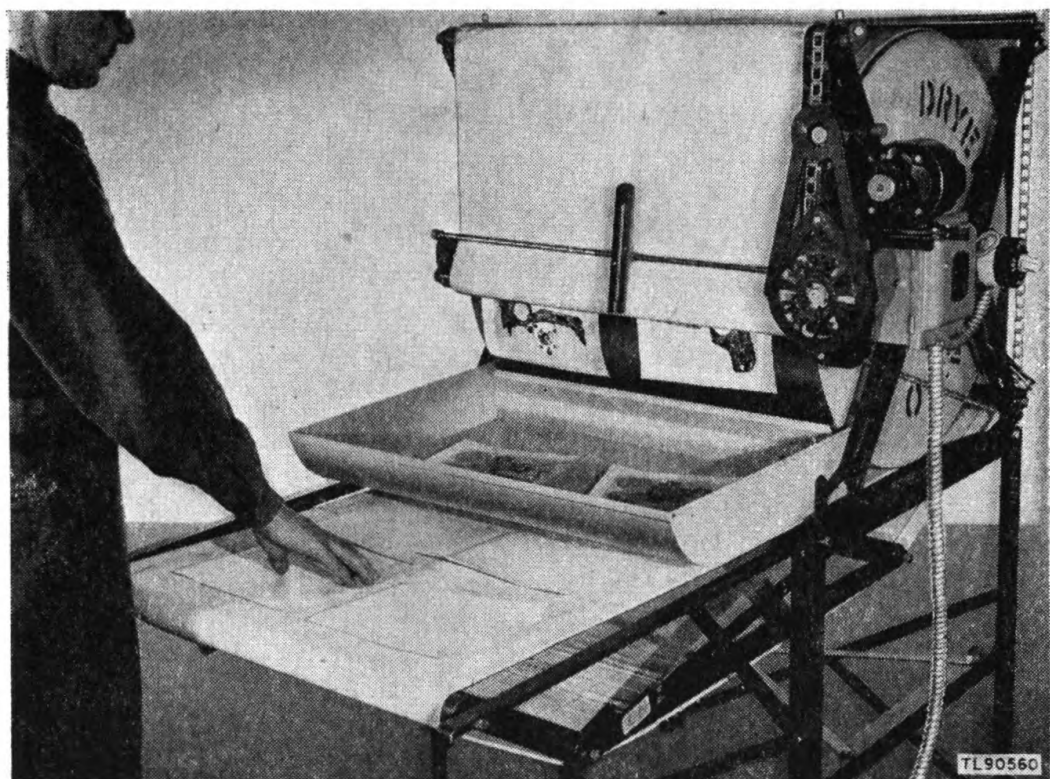


Figure 8. Dryer PH-176 in operation.

checking the amount of heat on the pyrometer, be sure that it is pressing lightly against the apron. The apron seam, passing in back of the pyrometer, pushes it slightly forward, thereby causing a false reading. The operator should form the habit of pushing the pyrometer back slightly each time the apron seam passes.

d. Various weights of prints require more or less time to dry. The variations in time, attained by faster or slower rotation of the drum, are controlled by the positioning of the short belt on the cone pulleys. When small single-weight prints are being dried, the short belt should be placed in the outside grooves, which is the largest groove on the motor shaft and the smallest groove on the countershaft. This will give a time of about 4 minutes for the complete rotation of the drum. When larger single-weight or small double-weight prints are being dried, place the short belt in the second pair of grooves, thereby obtaining a speed of about 5 minutes for the complete cycle. For heavier paper and large prints, set the belt on the smallest groove in the motor shaft pulley and the largest groove in the countershaft pulley, thereby obtaining a speed of about 7 minutes for the complete cycle. These settings



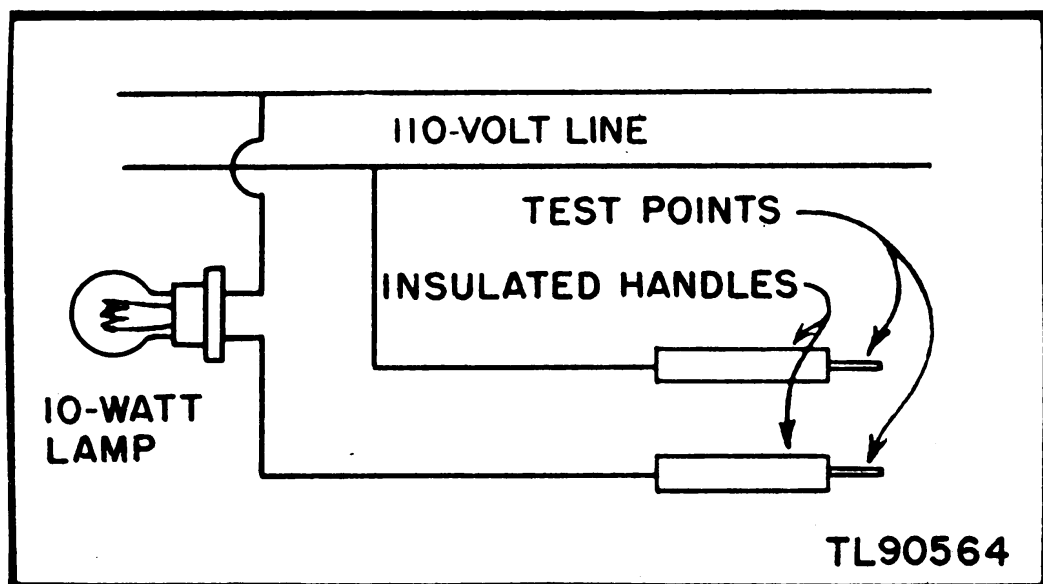


Figure 9. Test lamp set.

are all based on NORMAL heat. Never change the placing of the belt without first stopping the motor.

e. When all prints have been dried, *turn off the heat but leave the motor running until the drum has cooled sufficiently to permit the operator to hold his hand against the drum face.* Keep the apron clean. To prevent dust and grime from settling on the apron, always cover the dryer when not in use.

## SECTION III

# MAINTENANCE

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**NOTE:** Unsatisfactory performance of this equipment will be reported immediately on W.D., A.G.O. Form No. 468, and forwarded through channels to the Office of the Chief Signal Officer, Washington 25, D. C. If this form is not available, use TM 38-250.

### 8. SERVICE INSPECTION AND MINOR REPAIRS.

**a. Apron.** Inspect the operating surface of the apron once a day for dirt and chemical stains, which, if allowed to remain, will transfer to the prints being dried. Check the alignment of the apron daily to keep its edges from being frayed.

**b. Motor.** If the motor is kept oiled as described in paragraph 9, service should be indefinite. If the motor becomes unserviceable, it must be replaced.

**c. Fuses.** To inspect for burned-out fuses (fig. 5), open the safety switch box. Examine the fuses and replace any that do not complete the circuit when they are tested on a test lamp set (fig. 9). The two right-hand fuses are of 30-ampere capacity and the left-hand fuse is of 4-ampere capacity.

**d. Belt.** The two belts must be inspected for wear every 6 months. If they show signs of excessive wear, replace them. To increase the tension of the driving belt, loosen the motor bolts and move the motor in an outward direction. Allow the belt sufficient slack so that it operates the unit without slipping. When the belt is properly tensioned, tighten the motor bolts again, checking to see that the pulleys remain in line with each other.

**e. Worm and Main Gear.** The worm and main gear (fig. 10 ②) located under the gear cover on the motor bracket should be inspected for wear every 6 months. Make the inspection when the cover (fig. 10 ④) is removed for lubrication. Replacement of the worm-shaft assembly and main gear is advisable when the teeth are worn in half.

**f. Bushings in Rollers.** The feeding table and apron take-up roller ends are fitted with oil-impregnated wooden bushings. The sprockets pressed in one end of all drive rollers serve as the bushings for that end, and an oil-impregnated wooden bushing is fitted in the other end. Wear in the bushing will not become noticeable for several years. When the bushings are worn sufficiently that the apron does not run straight, replace them.

**NOTE:** No precautions are needed against moisture or fungus, since the operating temperature is sufficient to inhibit fungus growth or the formation of moisture on the equipment surface. Whenever the dryer is idle for a period of 24 hours or more, it is recommended that it be heated to operating temperature for a short period each day. Set the drum in rotation during this period to prevent scorching the apron.

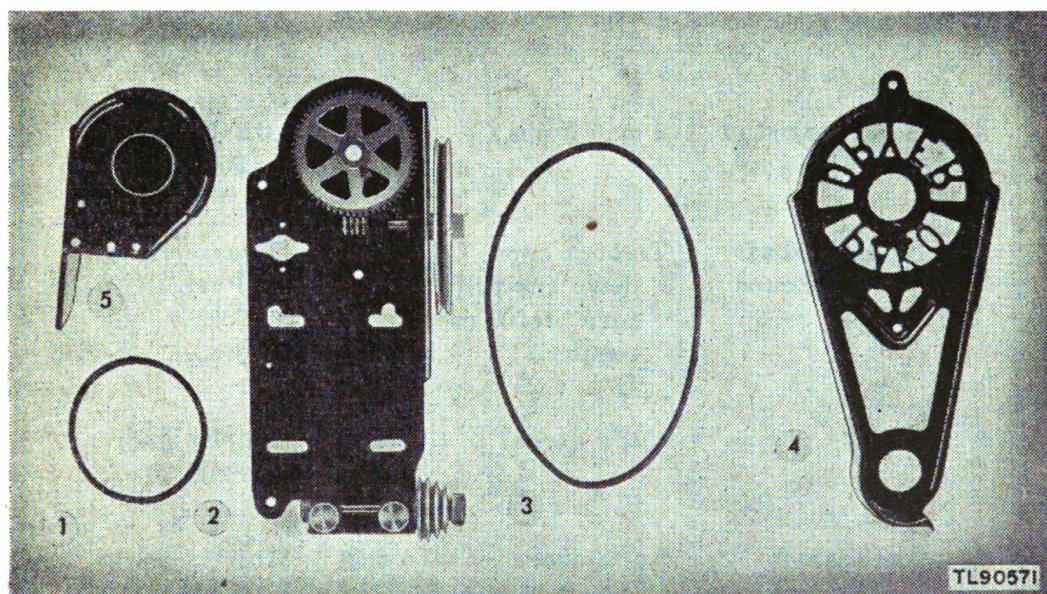


Figure 10. Gear reduction system, disassembled.

**9. LUBRICATION (fig. 19).** The table on the next page shows the frequency of lubrication required for the equipment.

**a.** Clean parts with Solvent, Dry Cleaning, Federal Spec. No. P-S-66a, which is available as a cleaning fluid through regular channels. Thoroughly dry all parts before lubricating. To prevent soiling the apron, clean the surrounding surfaces after lubricating.

**b.** Remove the cover to lubricate the drive shaft, worm gear drive, and driven gear shaft. Replace cover after lubricating.



c. Do not lubricate the apron roller shaft bearings and chain.

d. The frequency of lubrication is shown below in operating hours after which the equipment should be lubricated. Reduce the number of hours under severe operating conditions.

<i>Point No. (fig. 19)</i>	<i>Nomenclature</i>	<i>Quantity</i>	<i>Frequency (hours)</i>	<i>Type of lubrication</i>
1	Drum (Oil hole on both sides)	2 or 3 drops in each oil hole	256	Oil, Engine, SAE 30
2	Rollers	1 drop each	256	Oil, Engine, SAE 30
3	Idler gear stud	2 or 3 drops	256	Oil, Engine, SAE 30
4	Counter shaft grease cups	Tighten cups down one full turn; refill as required	256	Grease, General Purpose, No. 2
5	Motor	3 or 4 drops	256	Oil, Engine, SAE 30
6	Drive shaft (See b. above)	2 or 3 drops	256	Oil, Engine, SAE 30
7	Worm gear drive	Clean and coat lightly	256	Lubricant, Gear, Universal, SAE 90
8	Driven gear shaft (See b. above)	3 or 4 drops	256	Oil, Engine SAE 30

## 10. TROUBLE CHART.

<i>Trouble</i>	<i>Probable cause</i>	<i>Remedy</i>
Prints do not dry.	Speed control is set too fast for the weight of paper being dried; the heater switch is not set at a high enough temperature for the speed of the apron.	Adjust speed control to a slower setting and change heater switch setting to a higher temperature until prints come out dry.
Prints stick to drum.	Prints are being put on the apron emulsion side up.	Place them face down.
Prints are folded or wrinkled.	Prints are not being placed in the proper flat position on the apron.	Place each print flat and face down on the apron with a slight forward sliding motion to wipe out and smooth surface.
Prints are dry except for a few spots.	Prints have not been sufficiently drained and/or water is dripping on the apron from the batch of prints being placed in the dryer.	Drain the prints thoroughly by stacking them for a few minutes at an angle so that surface water can run off. Do not let water drip on apron.
Prints stick to apron.	The emulsion is soft and jelly-like because of insufficient hardening. This is especially true when atmosphere is hot and humid.	Check the hardening properties of the fixing bath or the temperature of the water.
Prints have apron markings on them.	The emulsion is too soft, or prints are placed on the apron lacings.	Same remedy as above and/or keep prints off apron lacings.

Table continued on next page.

# 10. TROUBLE CHART (Contd.)

<i>Trouble</i>	<i>Probable cause</i>	<i>Remedy</i>
Prints are stained.	Faulty fixing bath, improper washing, bringing prints or solutions into contact with brass, or dripping dirty or hypo-laden water on apron.	Use correctly mixed fresh hypo. Wash prints thoroughly. Do not handle or use brass in processing prints. Avoid dripping dirty water.
Prints have blisters.	Defects in the paper, rough handling of the paper, or dripping water on the apron.	Use care in handling prints. Do not bend prints or rub them together. Do not lay prints on drops of water which might have fallen on the apron.
Heat is insufficient to dry prints when speed is correct and the heater switch is on HIGH.	Power supply voltage is too low.  Faulty switch. One or more heating element is burned out or disconnected.	Check the voltage entering the switch box with a voltmeter. If the voltage is too low, correct it, if possible. If impossible, operate the dryer at a reduced speed. Replace switch. Replace or reconnect the faulty element.
Motor fails to operate when service cord is connected to correct source of current.	Dryer is jammed.  Burned out fuse. Broken wire.	Examine dryer for object caught in chains, motor belt, or apron.  Replace defective fuse. Examine wiring and replace defective wiring.



<p>The apron runs to the right (as viewed from the feeding table end).</p>	<p>The dryer is out of alignment. Either the base is not level or the drum does not run parallel with the feeding table roller.</p>	<p>Revolve the drum until its seam is nearest the feeding table roller. Adjust the drum journal clamps so that the distance from the seam to the front feeding table roller is the same on both sides of the dryer. If the apron still refuses to run straight, raise the left rear leg with the leveling wheel, a little at a time.</p>
<p>The apron runs to the left.</p>	<p>Same as above.</p>	<p>Carry out the above procedure for paralleling the drum with the feeding table roller; then, if the apron still runs to the left, raise the right rear leg with its leveling wheel.</p>
<p>Dryer stops while loaded with prints.</p>	<p>Power supply fails.</p>	<p>Turn off safety switch and immediately check all wiring and fuses. Enough slack may be made in the apron to remove any valuable prints by lifting the apron take-up assembly and pulling the slack up to the apron. Reach in and remove any prints that are in danger of being scorched.</p>

## 11. REPLACEMENT OF APRON.

**a. Disassembly.** If the apron becomes so soiled that dirt or stains are transferred to the surface of the prints, or if it has been scorched or torn, or has become frayed or otherwise damaged, replace it. In most cases, the apron cannot be repaired, and it is never laundered satisfactorily. To remove the damaged apron, cut the lacing thread and run apron off the machine.

**b. Reassembly.** (1) Place a large piece of paper on the integral stays between the legs to avoid soiling the new apron. Raise the apron take-up assembly to the position indicated by dotted lines in figure 12, and tie it to the feeding table arm. Place the new, rolled-up apron in the print tray.

(2) Draw the free end of the apron under the main driving roller assembly and over and around the drum assembly with the canvas

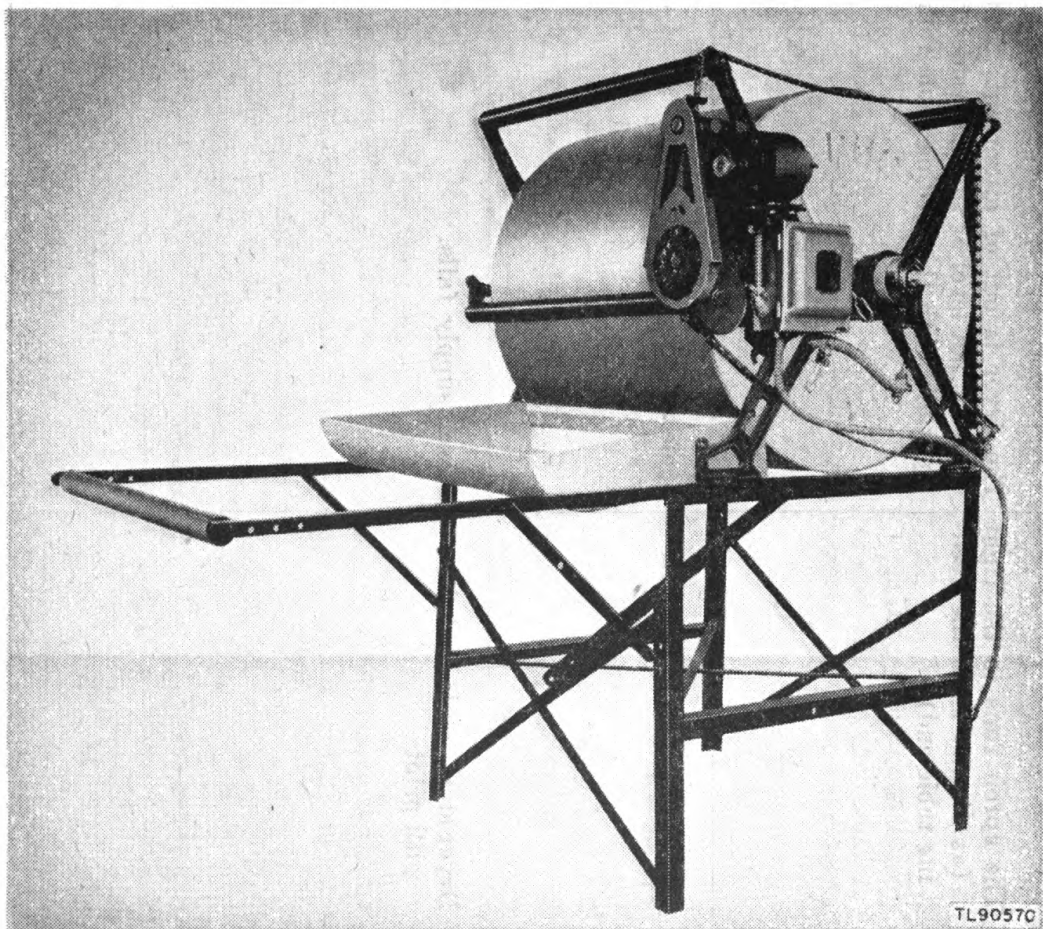


Figure 11. Dryer PH-176, apron removed.

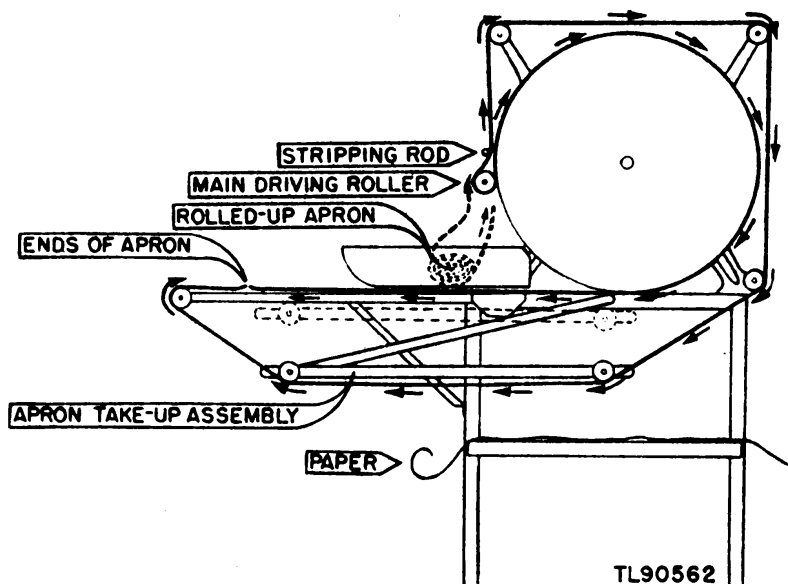


Figure 12. Apron installation.

duck side of the apron towards the drum. Bring this end above the take-up rollers to the position shown in figure 12.

(3) Unroll the apron and carry the other end up from the main driving roller, under the stripping rod, and over and around the three standard drive roller assemblies. From here take the end below the feeding table roller to meet the first end, and then fasten the ends together with a temporary cross-stitch of thread.

(4) To lace the apron, thread the large needle packed with each replacement apron with 8 feet of thread; double the thread and knot the ends together. Proceed with the steps shown in figure 13.

## 12. ELECTRICAL REPAIRS.

**a. Safety Switch.** If the safety (main) switch becomes defective, it is necessary to remove and replace it. If it is not bent by some heavy blow or allowed to become very dirty, the safety switch will operate indefinitely (fig. 16).

(1) To remove the safety switch, disconnect from the binding posts the two wires leading from the switch to the motor. Remove the locknut from the angle connector through which the armored cable is fed into the switch box. Lift the connector from the box.

(2) Repeat this procedure with the connector through which the wires from the porcelain base switch are fed into the box. Lift this connector from the box.



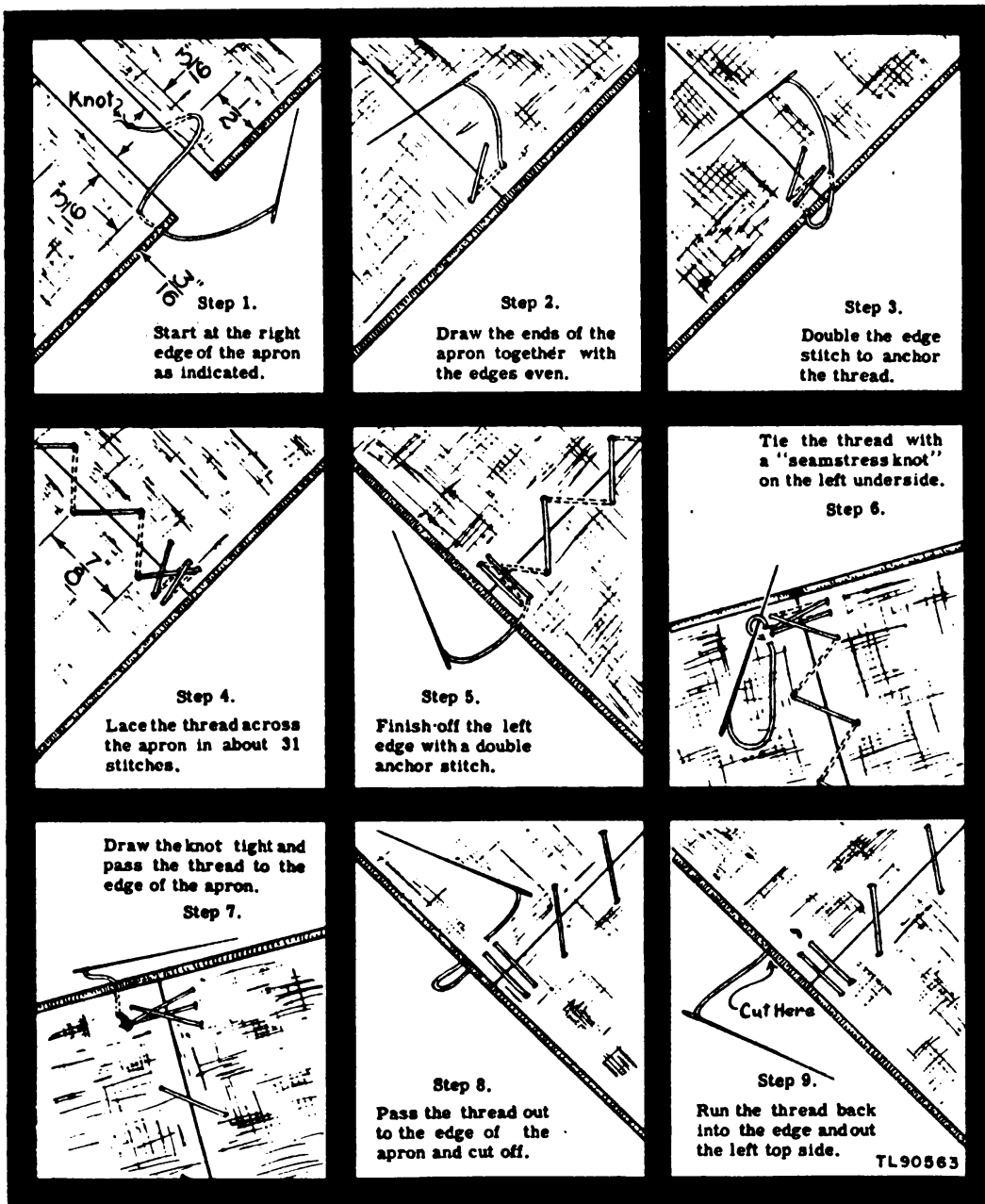


Figure 13. Lacing of apron.

(3) Remove with a screwdriver the two visible bolts from the inside of the box. Hold the nuts behind the side frame so that they will not fall inside the mechanism and be lost. A third bolt is on the left-hand side of the box under the fuse mounting. Remove this bolt by unscrewing the nut in the back of the side frame, since the bolt head is hidden.

(4) Remove the switch box, and replace it with a new one. In replacing the new box, be sure that all connections are replaced exactly as they were before. Consult the wiring diagram (fig. 18).

**b. Heater Switch.** Pull the knob outward (fig. 16), turn it to the left until unscrewed. This frees the bakelite cover and exposes the wiring connections. Label the terminals and the wiring before disconnecting them.

(1) On the nickel-colored connector in the upper left corner of the switch is connected one of the leads from the safety switch and the white lead from the heater. Diagonally across from the nickel-colored connector is connected the white line from the safety switch box. On the upper right brass connector is attached the red wire from the heater, and on the lower left is the green wire from the heater (fig. 18). Loosen the binding screws in the connectors and release the wires.

(2) Remove the two screws which are countersunk and which hold the switch to the spider cover of the box. Remove the switch and replace it. In replacing it, be sure that all leads are connected properly.

**c. Service Cord.** Inspect the service cord for a broken lead by placing the points of the test lamp set (fig. 9) on the ends of the leads. If the test lamp lights, the leads are satisfactory. If the insulation is not cut or damaged, the cord is still fit for further service. Examine the plug on the end of the cord. Do not use it if it is bent or has loose connections.

### 13. REPLACEMENT OF HEATING UNIT.

**α. Inspection.** Make an inspection while the dryer is in operation to determine whether or not replacement is necessary.

(1) Remove the handhole cover from the drum end nearest the snap switch. The three bricks are visible through the opening thus uncovered. These bricks each contain two heater coils, connected at a center tap (fig. 14).

(2) Turn the safety switch to ON and the heater switch to HIGH. Allow a few minutes for the heater coils to get hot. As the drum rotates and the handhole reaches an upper position, see if all the coils are glowing. If one or more of the coils fail to reach a glowing temperature, it indicates that the coil is burned out and must be replaced.

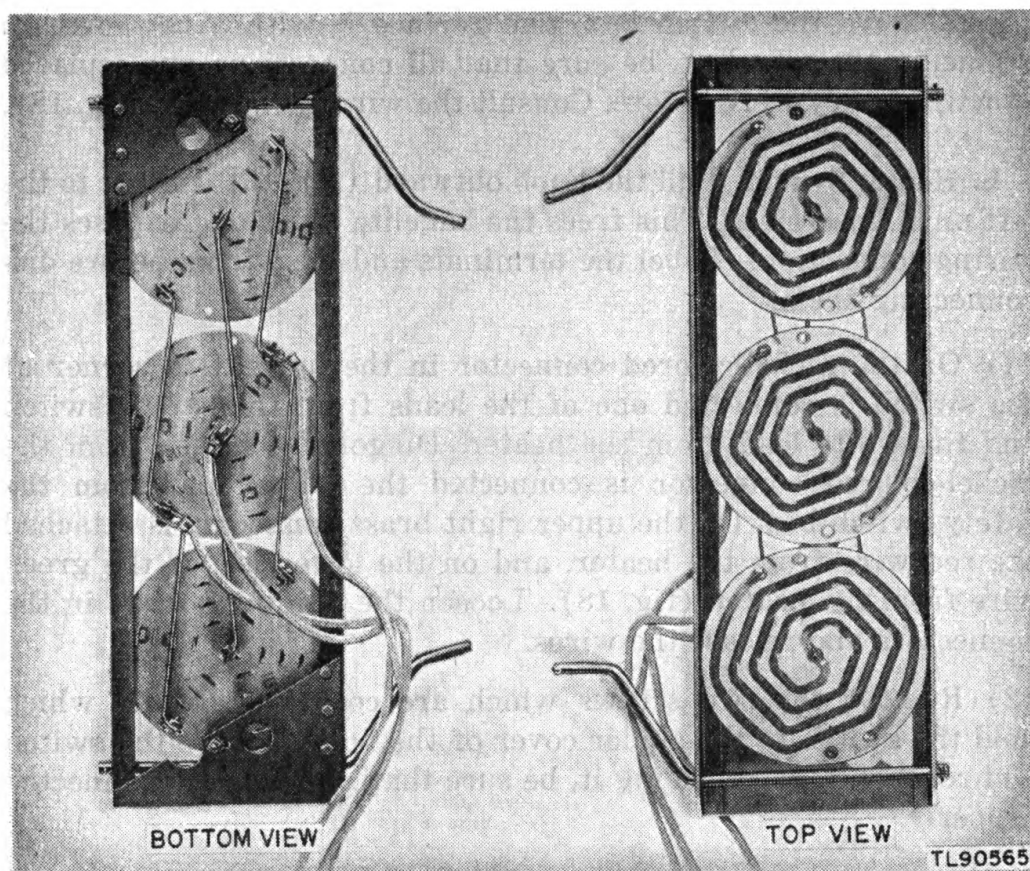


Figure 14. Heating assembly, top and bottom view.

**b. Disassembly.** (1) Turn the heater switch to OFF. Allow the drum to cool sufficiently so that the operator can place his hand on it. After the drum has cooled, stop the motor when the hand-holes are in a position below the heating unit assembly. Work through the handholes, and disconnect the three heater-brick wires from their terminals under the heating unit.

(2) Remove the two suspension-rod cotter pins which hold in place the ends of the suspension rods which pass through the drum journal inside the drum. Withdraw the heating unit assembly carefully through the handhole.

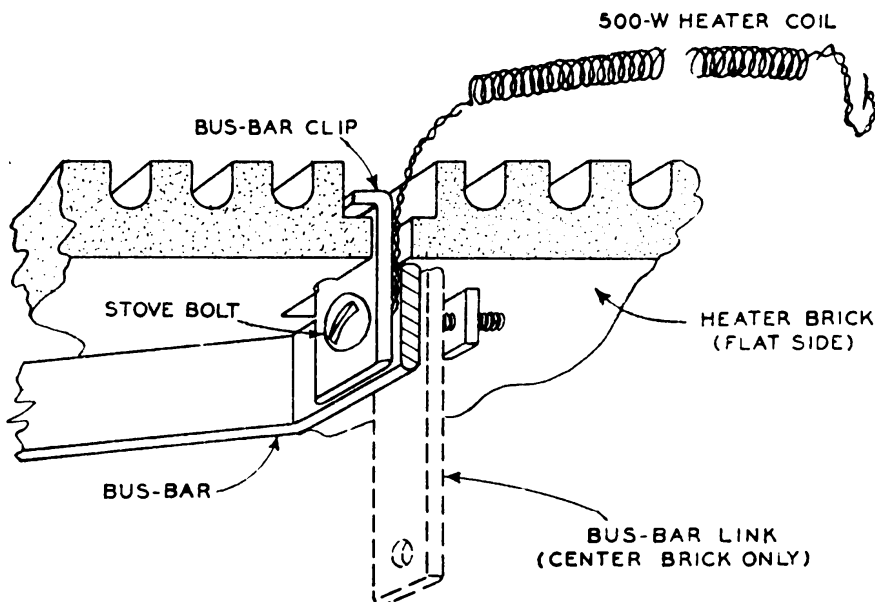
(3) Remove the heater bricks and the connecting bus-bars from the heater-brick support by taking out the two bolts at the remote outer edges of the two outside bricks.

(4) To replace heating coils in the heater brick, insert the twisted ends of two 500-watt coils through the center rectangular slot, together with the bus-bar clip and the stove-bolt nut. Stretch one

coil at a time and lay it into the spiral recess, being careful to obtain as even a spacing between each turn of the coil as possible. It may take several attempts in order to have the stretched length coincide with the curved length of the spiral coil recess. This will allow the free twisted end to be inserted through the rectangular slot near the edge of the brick. Secure this end temporarily. Follow this procedure on all three heater bricks. Next, remove the nuts on the three center terminals, being careful not to lose the twisted coil ends, and place the three bricks so that the odd-bent bus-bar may be connected to the three terminals. Replace the nuts but do not tighten them until the other two bus-bars have been connected in a similar fashion. The wires to the outside of the machine are connected to the center brick terminals through short links which stand perpendicular to the brick (fig. 15).

**c. Reassembly.** (1) Replace the heater bricks and connecting bus-bars with the new heating unit. Pass the stove bolts through the remote outer edges of the outside heater bricks. Place a washer between the heater brick support and the two outside heater bricks as a spacer.

(2) Pass the heater unit through the handhole to the inside of the drum. Insert the suspension rod ends through the holes in the drum



TL90572

Figure 15. Replacement of heater coil.



journal. To do this, hold the heater unit in the approximate position it is to occupy inside the drum. This is best done by two men, one working through each handhole. Secure the suspension rods with the cotter pins. Connect the three wires to the proper bus-bar links (fig. 15).

#### 14. REPLACEMENT OF MOTOR.

α. Disconnect the two motor leads inside the safety switch box. Remove the belt guards. Slip the short belt off the cone pulley on the motor shaft. Remove the four bolts which hold the motor to the motor mount and lift the motor off.

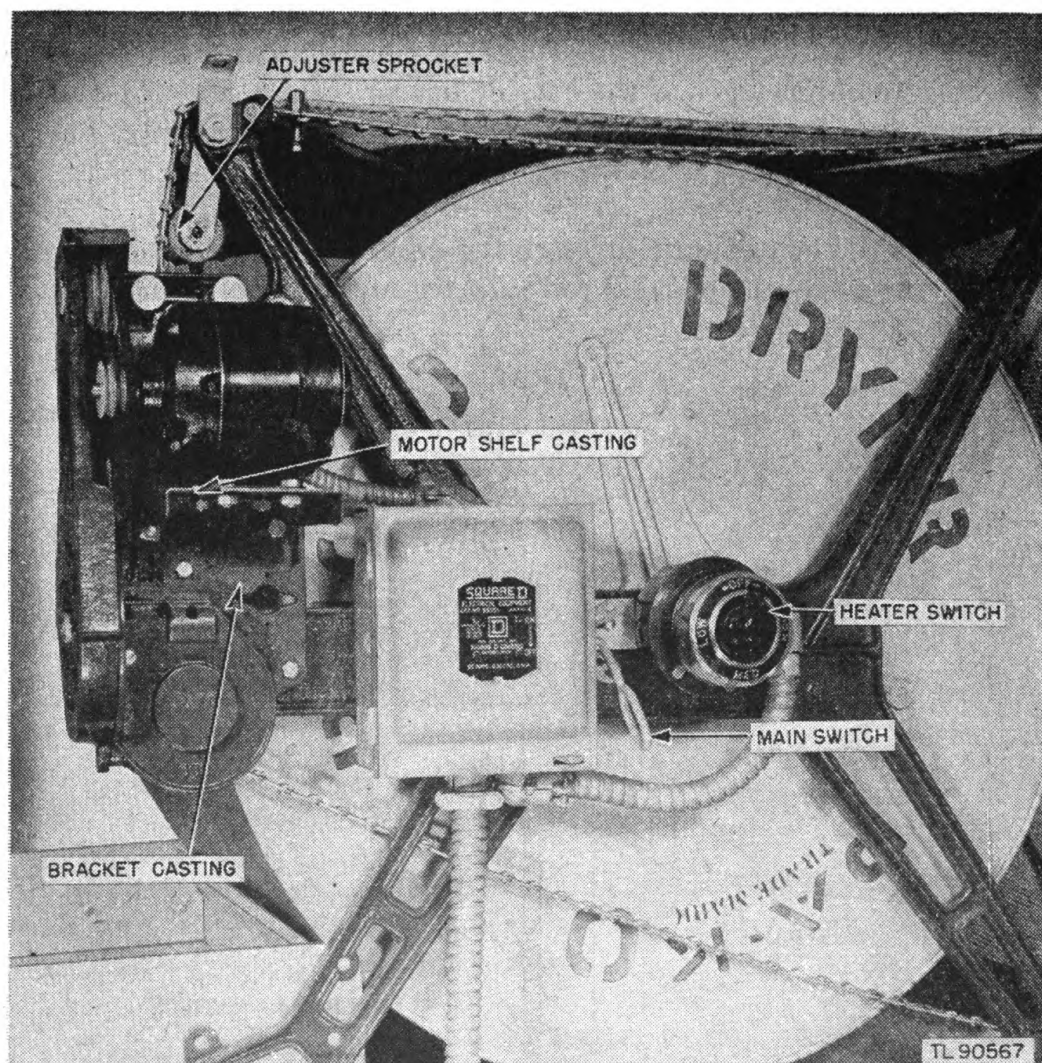


Figure 16. Dryer PH-176, right side detail view.

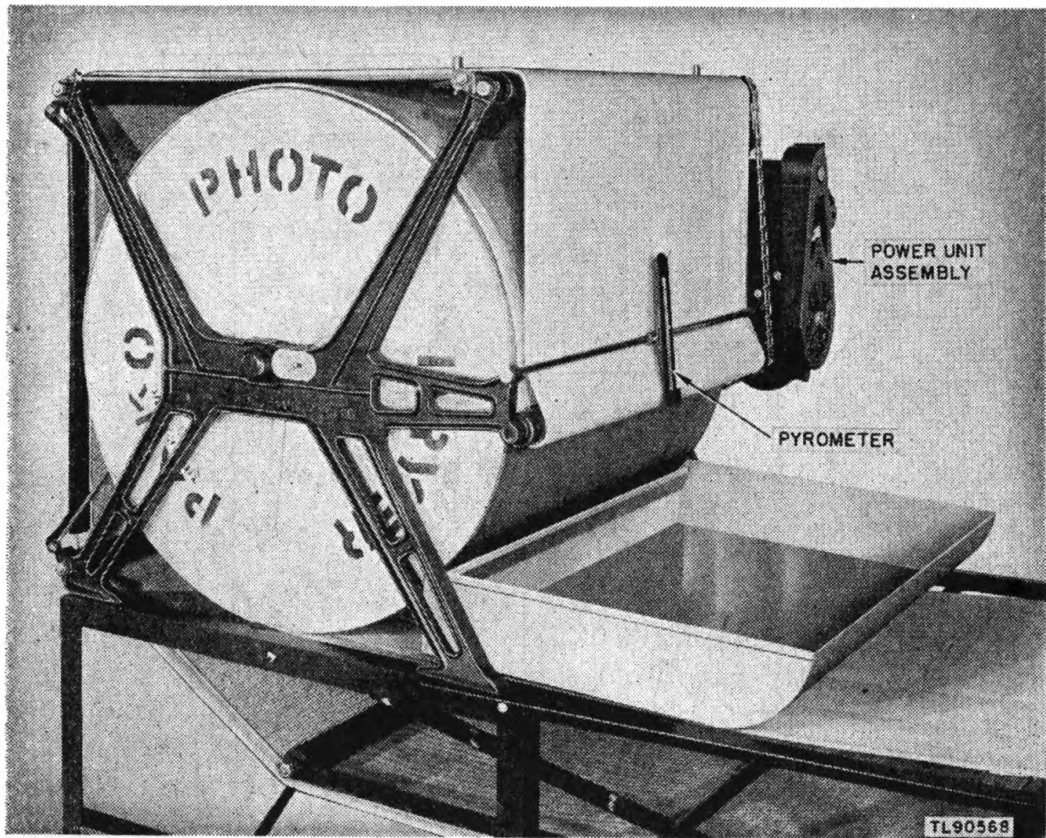


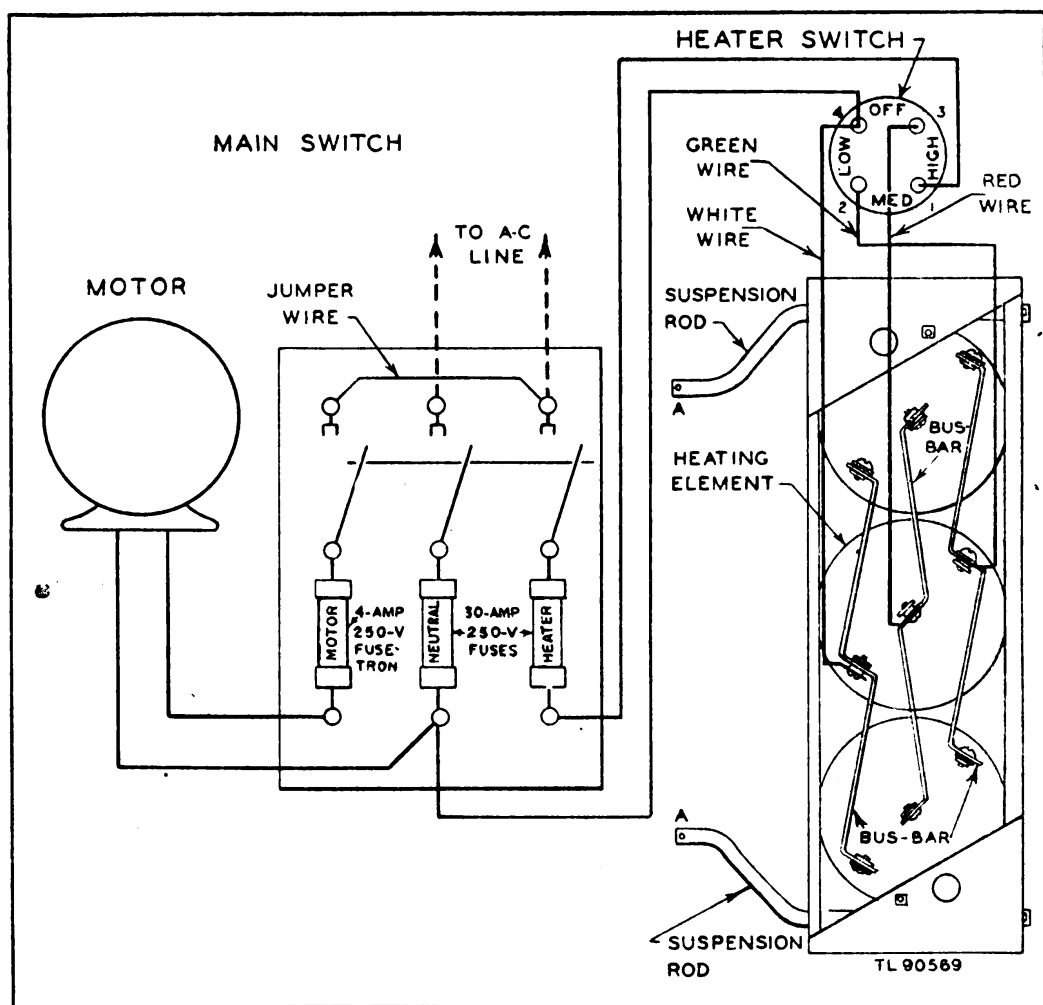
Figure 17. Dryer PH-176, left side detail view.

b. If the motor becomes unserviceable, replace it with a new one, since it is not practical to repair it. Place the new motor in position, aligning the cone pulley on the motor shaft carefully with that on the countershaft. Put the small belt into place over the two cone pulleys. Pull the motor outward until the short belt tightens up enough to operate the unit without slipping. Tighten the nuts on the four bolts which hold the motor on the motor mount (fig. 6).

## 15. REPLACEMENT OF DRUM

a. The drum may need to be replaced if it becomes dented. Care in operating the dryer and in protecting it from heavy blows will keep the drum in service for many years.

b. Remove the drum by dismantling the left side of the dryer, by removing all nuts including those on the bolts in the base. Remove the cap from the journal. Remove the left side frames after



removing the three screws which hold up the left side of the print tray. (Left, as used, is designated from the feeding table end of the dryer.) Remove the porcelain base snap switch from the right side as described in paragraph 12b. Remove the handhole covers. Remove the heater bricks, including the wiring as described in paragraph 13b. Lift the apron idler assembly and tie it into the feeding table arms. Slip the drum off the journal to the left.

- c. Replace it with a new drum, and replace all the parts which were removed. Check the wiring carefully (fig. 18).

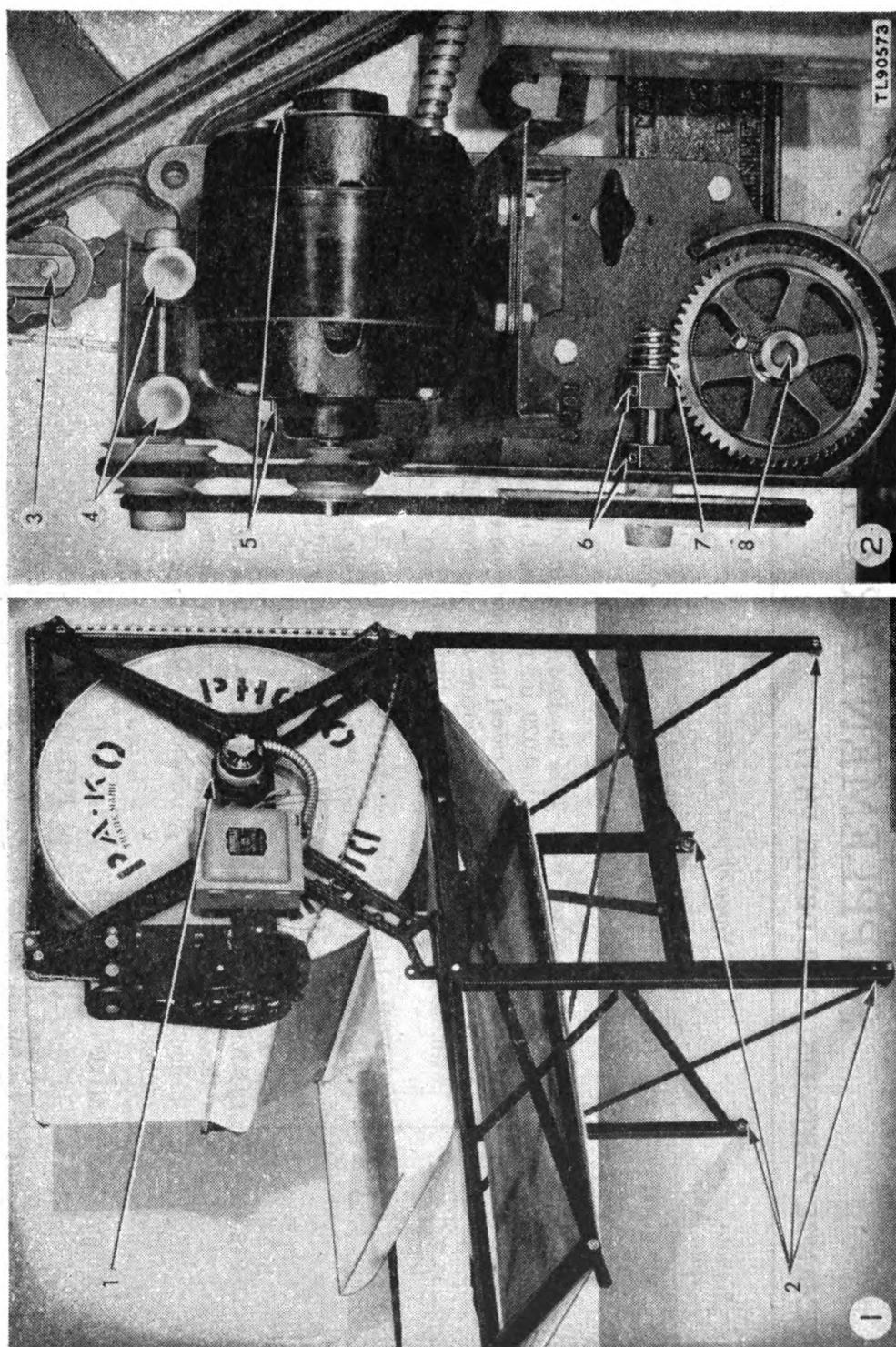


Figure 19. Lubrication points for Dryer PH-176.



# SECTION IV SUPPLEMENTARY DATA

## 16. MAINTENANCE PARTS LIST FOR DRYER PH-176.

<i>Fig. No.</i>	<i>Signal Corps stock No.</i>	<i>Name of part and description</i>	<i>Quan per unit</i>	<i>Run-ning spares</i>	<i>Orgn stock</i>	<i>3d ech</i>	<i>4th ech</i>	<i>5th ech</i>	<i>Depot stock</i>
1 and 12	8P12-400	APRON: woven fibre; canvas-covered; 21 ft. 1 in. long, 26 $\frac{3}{4}$ in. wide.	1				*	**	*
1	8P12-409	DRUM: galvanized iron; 27 $\frac{1}{8}$ in. long, 28 $\frac{1}{4}$ in. diam, 0.029 in. thick; lined with 0.029 in. galvanized iron, with $\frac{1}{2}$ in. asbestos between cases; hand parts on each end 7 $\frac{5}{8}$ in. diam; hand port covers 9 $\frac{3}{8}$ in. over-all with $\frac{1}{2}$ -in. asbestos lining between two plates.	1				*	**	*
14	8P12-412	HEATER: brick; plate; electric; 6 $\frac{1}{4}$ in. diam; $\frac{1}{8}$ in. thick; three coil taps; 115-v; two $\frac{1}{8}$ -in. mounting holes in each brick; one 500-w and one 600-w coil used in each plate.	3				*	**	*
16	8P12-416	LINK: chain; No. 25; $\frac{3}{4}$ in. wide x 1 $\frac{1}{8}$ in. long outside dimension, $\frac{1}{8}$ in. wide x $\frac{5}{8}$ in. long inside dimension; slide hook connection $\frac{1}{8}$ in. wide by $\frac{1}{2}$ in. high overall dimension.	78	2	*		*	**	*
7	3830000A05-15	MOTOR: GE model 5KH23AC1; 115-v; 60-cycle; 1-phase; 1725 rpm; type KH; 1/20 hp; 1.5-amp; GE J-type 213; temperature raise 40°F; continuous $\frac{3}{8}$ -in. shaft; splice box, 1 $\frac{1}{4}$ in. deep; 2 $\frac{3}{8}$ in. sq. with cover.	1				*	**	*

17	8P12-414	PYROMETER: 8 in. long x $1\frac{1}{2}$ in. wide; rolled edge; bulb cap at bottom, $\frac{3}{4}$ in. wide x $1\frac{1}{2}$ in. long; thermometer 6 $\frac{1}{2}$ in. long; spring-clip mounting on back, $1\frac{1}{4}$ in. wide to clip on $\frac{1}{2}$ -in. rod.	1	1	*	*	**	*
16	3Z9826-19	SWITCH: porcelain base snap; 30-amp, 125-v, to 15-amp, 250-v; base $3\frac{1}{4}$ in. diam, 1 in. high; over-all height of switch $3\frac{1}{2}$ in.; 3-temperature rate, LOW, HIGH, and MED.	1				**	*
10 (1)	8P12-403	BELT: composition; round; $\frac{1}{4}$ -in. diam; endless; 13 in. long inside.	1	1	*	*	**	*
10 (3)	8P12-404	BELT: composition; round; $\frac{1}{4}$ -in. diam; endless; $27\frac{3}{4}$ in. long inside.	1	1	*	*	**	*
5	3Z1903-30	FUSE: 30-amp; 250-v; Fed Spec W-F-791 (nonrenewable; ferrule contact; 2 in. long over-all with $\frac{1}{2}$ -in. x $\frac{1}{8}$ in. diam ferrule; National Elec Code Standard; can be substituted).	2	4	*	*	**	*
5	3Z1903-4	FUSE: 4-amp; 250-v; Bussman-Fusetron 404 (long time delay fuse; ferrule contact; 2 in. long over-all, with $\frac{1}{2}$ -in. x $\frac{1}{8}$ -in. diam ferrule).	1	2	*	*	**	*

\* Indicates stock available.

\*\* 5th echelon stocks are to be requisitioned as needed from depot stocks.

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